IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.	:	**10/798,519**	Confirmation No. **7245**
Applicant	:	**John Sievers, et al.**	
Filed	:	**March 11, 2004**	
TC/A.U.	:	**2621**	
Examiner	:	**Christopher G. Findley**	
Docket No.	:	**199-0231US**	
Customer No.	:	**29855**	
Title	:	**METHOD AND APPARATUS FOR IMPROVING THE AVERAGE IMAGE REFRESH RATE IN A COMPRESSED VIDEO STREAM**	

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APPEAL BRIEF

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I. REAL PARTY IN INTEREST

The real party in interest is Polycom, Inc.

II. RELATED APPEALS AND INTERFERENCES

There are no related proceedings.

III. STATUS OF CLAIMS

Claims 1–33 are rejected and are appealed.

IV. STATUS OF AMENDMENTS

None filed

V. SUMMARY OF CLAIMED SUBJECT MATTER

This section provides a concise explanation of the subject matter defined in each of the independent claims involved in the appeal, referring to the specification by paragraph and line number and to the drawings by reference characters as required by 37 CFR § 41.37(c)(l)(v). Where applicable, each element of the claims is identified with a corresponding reference to the specification and drawings. Citation to the specification and/or drawings does not imply that limitations from the specification and drawings should be read into the corresponding claim element. Additionally, references are not necessarily exhaustive, and various claim elements may also be described at other locations.

Independent claim 1 recites a method of quality-improvement of a digitally-encoded video sequence, wherein the video sequence comprises information representing a sequence of encoded frames, each encoded frame comprising one or more encoded macroblocks. The method includes:

- determining one or more processing capabilities of a decoder that will decode the video sequence (¶ 0034, ll. 3–4; ¶ 0036, ll. 1–2);
- encoding macroblocks of a first image (¶ 0031, ll. 4–5);
- encoding macroblocks of subsequent images, wherein some macroblocks are skipped (¶ 0032; ¶ 0036, ll. 4–7); and

- increasing video quality as a function of a fraction of macroblocks that are skipped to take advantage of decoder processing capability that would otherwise be unused as a result of the skipped macroblocks (¶ 0034–0035).

Independent claim 15 recites a video conferencing terminal. The video conferencing terminal includes:

- one or more image processing engines adapted to encode a video signal, wherein some macroblocks are skipped (¶ 0032; ¶ 0036, ll. 4–7; Fig. 2, #210); and
- a communication interface adapted to determine one or more processing capabilities of a decoder that will decode the encoded video and further adapted to increase video quality as a function of a fraction of macroblocks that are skipped to take advantage of decoder processing capability that would otherwise be unused as a result of the skipped macroblocks (¶ 0034–0035; ¶ 0036, ll. 1–2; Fig. 2, #212).

Independent claim 22 recites a method of quality-improvement of a digitally-encoded video sequence. The method includes:

- determining one or more processing capabilities of a decoder that will decode the video sequence (¶ 0034, ll. 3–4; ¶ 0036, ll. 1–2; ¶ 0047);
- increasing video quality as a function of an encoder model of decoder processing load to take advantage of decoder processing capability that would otherwise be unused (¶ 0048–0049).

Independent claim 27 recites a video encoder. The video encoder includes one or more image processing engines (Fig. 2, #210) adapted to:

- encode a video signal (¶ 0031, ll. 4–5);
- determine one or more processing capabilities of a decoder that will decode the encoded video sequence (¶ 0034, ll. 3–4; ¶ 0036, ll. 1–2; ¶ 0048–0049); and

- increase video quality as a function of an encoder model of decoder processing load to take advantage of decoder processing capability that would otherwise be unused (¶ 0048–0049).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1–33 stand rejected under 35 U.S.C. § 103(a) as obvious over U.S. Patent 7,114,174 to Brooks et al. ("Brooks) in view of U.S. Pre-Grant Publication 2005/0041740 to Sekiguchi et al. ("Sekiguchi"). Review of this rejection is sought.

VII. ARGUMENT

The claims do not stand or fall together. Instead, separate arguments for the claims are presented below grouped under subheadings as required by 37 C.F.R. § 41.37(c)(vii).

A. Claims 1 and 15 Are Not Obvious in View of Brooks and Sekiguchi

Claim 1 is drawn to a method of video processing and recites four limitations. These are: (1) determining one or more processing capabilities of a decoder that will decode the video sequence; (2) encoding macroblocks of a first image; (3) encoding macroblocks of subsequent images, wherein some macroblocks are skipped; and (4) increasing video quality as a function of macroblocks that are skipped to take advantage of decoder processing capability that would otherwise be unused as a result of the skipped macroblocks. At least two of the cited limitations, namely "determining one or more processing capabilities of a decoder …" and "increasing video quality as a function of macroblocks that are skipped to take advantage of decoder processing capability that would otherwise be unused as a result of the skipped macroblocks" are not found in the cited art. Claim 15 is drawn to a video conferencing terminal and includes similar limitations, namely, a communication interface that "determine[s] one or more processing capabilities of a decoder…" and "increase[s] video quality as a function of macroblocks that are skipped to take advantage of decoder processing capability that would otherwise be unused as a result of the skipped macroblocks."

Examiner contends that claims 1 and 15 are obvious over Brooks in view of Sekiguchi. Specifically, Examiner contends that the limitations of claim 1 and 15 reciting "determining one

or more processing capabilities of a decoder that will decode the video transmission" are met by Brooks at Fig. 6A, elements 810, 840, and 870. Final Rejection at 3–4. In summarizing these teachings, Examiner further states that "the video stream is manipulated to meet a target output color depth, resolution, and frame rate." *Id.* at 4. There is nothing about manipulating a video stream to meet a target output color depth, resolution, and frame rate that requires "determining one or more processing capabilities of a decoder." The cited portions of Brooks describe a method of transcoding video and describe techniques for matching the input video stream parameters (color depth, resolution, and frame rate) to the specified output parameters given to the transcoder. Examiner has cited no teaching or suggestion in Brooks that relates to determining processing capabilities of a decoder.

Furthermore, both claims 1 and 15 recite "increasing video quality as a function of a fraction of macroblocks that are skipped to take advantage of decoder processing capability that would otherwise be unused as a result of the skipped macroblocks." Applicants' specification teaches various examples of "increasing video quality" such as increasing frame rate and picture size. Other ways to increase the video quality are also contemplated, such as a finer degree of quantization, etc. Each of these examples is given to aid in understanding of the context of the invention, and are not intended to limit the claim language quoted above.

On page 4 of the Final Rejection, Examiner contends that this limitation is met by Brooks in Fig. 6A; col. 3, ll. 8–14. However, the cited passages do not teach or suggest "increasing video quality as a function of a fraction of macroblocks that are skipped…." In fact, the cited passages are entirely silent as to macroblock skipping, much less increasing video quality as a function of a fraction of macroblocks that are skipped. Moreover, in his very next sentence Examiner concedes that "Brooks does not specifically disclose encoding macroblocks … wherein some macroblocks are skipped and determining a target video quality … as a function of a fraction of macroblocks that are skipped." If Brooks does not disclose determining video quality as a function of macroblocks that are skipped, then it cannot meet the referenced limitation of claim 1, which clearly requires "increasing video quality as a function of a fraction of macroblocks that are skipped…."

Examiner goes on to propose Sekiguchi as teaching the missing limitation "increasing video quality as a function of a fraction of macroblocks that are skipped…." Examiner cites Fig.

2, element ST0 and Fig. 7, coding mode estimator 8 as teaching this limitation. Specifically, Examiner states that Sekiguchi teaches that "the coding mode is determined by analyzing a cost function if the frame is a mix of skipped blocks and non-skipped blocks." However, the determination of a coding mode in Sekiguchi is not an increase in video quality (as recited in claims 1 and 15), but rather a selection of a technique for most efficiently representing the data that is to be encoded. As with Brooks, Sekiguchi contains no teaching or suggestion of "increasing video quality as a function of a fraction of macroblocks that are skipped...."

> In response to this argument, Examiner states:
>
> One of ordinary skill in the art at the time of the invention would have found it obvious that the relationship between input video parameters, bandwidth limitations, and ***decoding-side processing capabilities*** and restraints would be represented in a cost function used for altering the coding scheme of Brooks. As such, the ***change in bit-rate resulting from macroblock skipping*** would impact the constraints on available bandwidth (Sekiguchi: paragraph [0003], "The need is growing for reusing video contents compressed by these coding schemes in a variety of platforms under conditions different in ... transmission bit rates"), and, in turn, the alternations made to the video being encoded (Brooks: column 3, lines 12–14 and column 3, line 66, through column 4, line 2; Figs. 6A and 6B, step 900).

Final Rejection at 2 (emphasis added). As an initial matter, it is unclear how the cited portions of the references relate to claims 1 and 15 or the rejection thereof. The quoted passage of Sekiguchi merely recites a need for transcoding video. This has no apparent relation to the pending claims or to increasing video quality as a function of a fraction of macroblocks that are skipped. The newly-cited portions of Brooks (*i.e.*, col. 3, l. 66–col. 4, l. 2 and Fig. 6B, step 900) relate to dynamic bandwidth/bitrate reduction. Again, this does not seem to bear any relation to the pending claims or to increasing video quality as a function of a fraction of macroblocks that are skipped.

Furthermore, the two emphasized phrases from the quoted passage above highlight the deficiencies of this rejection. First, neither reference teaches or suggests anything about decoding-side processing capabilities. Examiner has given no basis for his conclusion that it would have been obvious to include decoding-side processing capabilities in any determination made by the encoder.

Moreover, Examiner's reference to "the change in bit-rate resulting from macroblock skipping" manifests inattention to not just the concepts claimed, but also the express language of the claims. As noted above, claims 1 and 15 recite "increasing video quality as a function of a fraction of macroblocks that are skipped to take advantage of ***decoder processing capability*** that would otherwise be unused as a result of the skipped macroblocks." This decoder processing capability has little to do with network bandwidth or the bit rate of the video sequence, but rather the processing power of the decoder and the amount of processing that must be done to decode the video sequence. Skipping of macroblocks decreases the amount of processing that must be done, and therefore frees up processing power of the decoder. The claims recite increasing video quality to use this freed up power. It is clear that neither reference teaches increasing video quality (whether by increasing frame rate, increasing resolution, changing quantization parameters, or any other mechanism) in response to a number of macroblocks that are skipped. This radical difference between the claims and the scope and content of the prior art render a rejection under § 103(a) improper.

B. Claims 22 and 27 Are Not Obvious In View of Brooks and Sekiguchi

Claim 22 is drawn to a method of improving the quality of a digitally-encoded video sequences and recites two limitations. These are: (1) determining one or more processing capabilities of a decoder that will decode the video sequence; and (2) increasing video quality as a function of an encoder model of decoder processing load to take advantage of decoder processing capability that would otherwise be unused. These limitations are not found in the cited art. Claim 27 is drawn to a video encoder and including one or more image processing engines that "determine one or more processing capabilities of a decoder" and "increase video quality as a function of an encoder model of decoder processing load to take advantage of decoder processing capability that would otherwise be unused."

Examiner rejected claim 22 as follows: "Re claim 22, arguments analogous to those presented in claim 1 are applicable to claim 22, and, therefore, claim 22 has been analyzed and rejected with respect to claim 1 above." Final Rejection at 8. Examiner similarly rejected claim 27 as follows: "Re claim 27, arguments analogous to those presented in claim 1 are applicable to claim 27, and, therefore, claim 27 has been analyzed and rejected with respect to claim 1 above."

Id. at 8. As an initial matter, reasons why the rejection of claim 1 are improper were set forth in detail above. Those reasons are equally applicable here.

Moreover, it is respectfully submitted that claims 22 and 27 are of different scope than claim 1. Claim 1 recites "increasing video quality as a function of a fraction of macroblocks that are skipped...." Conversely, claim 22 recites "increasing video quality as a function of an encoder model of decoder processing load...." These are not the same thing. Similarly claim 27 recites a video encoder that includes "one or more image processing engines adapted to ... increase video quality as a function of an encoder model of decoder processing load...." Again, the limitations of claims 22 and 27 are fundamentally different from the limitations of claim 1. Claim 22 and 27 recite determining video quality according to an encoder model of the decoder processing load. Neither Brooks nor Sekiguchi teaches an encoder that determines encoded video quality according to a model of decoder processing load. Therefore, the rejections of claim 22 and 27 as obvious over Brooks in view of Sekiguchi is also improper for this reason.

In response to this argument, Examiner states: "Brooks discloses altering video parameters on the encoding side in accordance with the capabilities of the target decoder (Brooks: Fig. 5A, step 610; column 15, lines 30–42; Fig. 5B, step 680 (transcoding operation) corresponds to Figs. 6A and 6B)." Final Rejection at 3.

As with the Examiner's response to the arguments presented with respect to claims 1 and 15, it is unclear how the newly cited portions of Brooks relate to the limitations at issue. Step 610 of Fig. 5A is identified as "Determine bandwidth limitations and format requirements." Neither a bandwidth limitation nor a format requirement is "an encoder model of decoder processing load" as recited in both claims 22 and 27. The related text at col. 15, ll. 30–42 describes determining network bandwidth available for a transmission. Again, this is not an encoder model of decoder processing load. Figure 5B, step 680 is identified as "Transcode input video data to the desired output video." This appears to be merely a conventional video transcoding operation, and there is certainly no teaching or suggestion of "an encoder model of decoder processing load" much less such a model being used to increase video quality as a function of such a model. Therefore, the rejection of claims 22 and 27 is improper.

C. Conclusion

Because the rejections of each independent claim as obvious over Brooks in view of Sekiguchi are improper, the rejections of claims depending therefrom are also improper. Therefore, Applicants respectfully submit that all outstanding rejections should be reversed. Additionally, to the extent specific claims have not been addressed, these claims depend from one or more claims that are specifically addressed, and are therefore patentable for at least the same reasons as the claims specifically addressed. Applicants further believe that they have complied with each requirement for an appeal brief.

In the course of the foregoing discussions, Applicants may have at times referred to claim limitations in shorthand fashion, or may have focused on a particular claim element. This discussion should not be interpreted to mean that the other limitations can be ignored or dismissed. The claims must be viewed as a whole, and each limitation of the claims must be considered when determining the patentability of the claims. Moreover, it should be understood that there may be other distinctions between the claims and the prior art which have yet to be raised, but which may be raised in the future.

If any fees are required or have been overpaid, please appropriately charge or credit those fees to Deposit Account Number 501922, referencing docket number 199-0231US.

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Respectfully submitted,

/Billy C. Allen III/

August 25, 2008

Filed Electronically

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VIII. CLAIMS APPENDIX

1. (original) A method of quality-improvement of a digitally-encoded video sequence, wherein the video sequence comprises information representing a sequence of encoded frames, each encoded frame comprising one or more encoded macroblocks, the method comprising:

   determining one or more processing capabilities of a decoder that will decode the video sequence;

   encoding macroblocks of a first image;

   encoding macroblocks of subsequent images, wherein some macroblocks are skipped;

   and increasing video quality as a function of a fraction of macroblocks that are skipped to take advantage of decoder processing capability that would otherwise be unused as a result of the skipped macroblocks.

2. (original) The method of claim 1 wherein the step of determining one or more processing capabilities of a decoder comprises having prior knowledge of the decoder type.

3. (original) The method of claim 1 wherein the step of determining one or more processing capabilities of the decoder comprises receiving processing capability information from the decoder.

4. (original) The method of claim 1 wherein the step of determining one or more processing capabilities of the decoder comprises determining the number of macroblocks that can be decoded in a given interval if all macroblocks are skipped.

5. (original) The method of claim 4 wherein the step of increasing the video transmission frame rate comprises determining the maximum frame rate in accordance with the following expression:

$$MaxFrameRate = \frac{1}{\frac{N_{coded}}{MaxMBPS} + \frac{N_{skipped}}{MaxSKIPPED}}$$

where N_{coded} is the number of coded macroblocks, $N_{skipped}$ is the number of skipped macroblocks, MaxMBPS is the maximum number of macroblocks that can be decoded in a given interval, and MaxSKIPPED is the maximum number of macroblocks that can be decoded in a given interval if all macroblocks are skipped.

6. (original) The method of claim 1 wherein the step of increasing video quality comprises increasing a video frame rate.

7. (original) The method of claim 1 wherein the step of increasing video quality comprises increasing a video picture size.

8. (original) The method of claim 1 wherein the step of increasing video quality further comprises increasing a video frame rate as a function of a computational cost of the decoder to decode various types of macroblocks.

9. (original) The method of claim 1 wherein the step of increasing video quality further comprises increasing a video picture size as a function of a computational cost of the decoder to decode various types of macroblocks.

10. (original) The method of claim 1 further comprising: taking account of a number of coefficients included in the encoded macroblocks and a computational requirement of the decoder as a function of this number.

11. (original) The method of claim 10 wherein the step of increasing video quality comprises increasing a video frame rate.

12. (original) The method of claim 10 wherein the step of increasing video quality comprises increasing a video picture size.

13. (original) The method of claim 10 wherein the step of increasing video quality further comprises increasing a video frame rate as a function of a computational cost of the decoder to decode various types of macroblocks.

14. (original) The method of claim 10 wherein the step of increasing video quality further comprises increasing a video picture size as a function of a computational cost of the decoder to decode various types of macroblocks.

15. (original) A video conferencing terminal adapted to produce encoded video including a sequence of encoded frames, each encoded frame comprising one or more encoded macroblocks, the video conferencing terminal comprising:

one or more image processing engines adapted to encode a video signal, wherein some macroblocks are skipped; and

a communication interface adapted to determine one or more processing capabilities of a decoder that will decode the encoded video and further adapted to increase video quality as a function of a fraction of macroblocks that are skipped to take advantage of decoder processing capability that would otherwise be unused as a result of the skipped macroblocks.

16. (original) The video conferencing terminal of claim 15 wherein the processing capability of the decoder is determined as a function the number of macroblocks that can be decoded in a given interval if all macroblocks are skipped.

17. (original) The video conferencing terminal of claim 17 wherein a maximum frame rate is determined in accordance with the following expression:

$$MaxFrameRate = \frac{1}{\frac{N_{coded}}{MaxMBPS} + \frac{N_{skipped}}{MaxSKIPPED}}$$

where N_{coded} is the number of coded macroblocks, $N_{skipped}$ is the number of skipped macroblocks, MaxMBPS is the maximum number of macroblocks that can be decoded in a given interval, and MaxSKIPPED is the maximum number of macroblocks that can be decoded in a given interval if all macroblocks are skipped.

18. (original) The video conferencing terminal of claim 15 wherein video quality is increased by increasing a frame rate.

19. (original) The video conferencing terminal of claim 15 wherein video quality is increased by increasing an picture size.

20. (original) The video conferencing terminal of claim 18 wherein the frame rate is further determined as a function of a computational cost of the decoder to decode various types of macroblocks.

21. (original) The video conferencing terminal of claim 19 wherein the picture size is further determined as a function of a computational cost of the decoder to decode various types of macroblocks.

22. (original) A method of quality-improvement of a digitally-encoded video sequence, the method comprising:

determining one or more processing capabilities of a decoder that will decode the video sequence; and

increasing video quality as a function of an encoder model of decoder processing load to take advantage of decoder processing capability that would otherwise be unused.

23. (original) The method of claim 22 wherein the step of determining one or more processing capabilities of a decoder comprises having prior knowledge of the decoder type.

24. (original) The method of claim 22 wherein the step of determining one or more processing capabilities of the decoder comprises receiving processing capability information from the decoder.

25. (original) The method of claim 22 wherein the step of increasing video quality comprises increasing a video frame rate.

26. (original) The method of claim 22 wherein the step of increasing video quality comprises increasing a video picture size.

27. (original) A video encoder for generating an encoded video sequence, comprising:

one or more image processing engines adapted to:

encode a video signal;
determine one or more processing capabilities of a decoder that will decode the encoded video sequence; and
increase video quality as a function of an encoder model of decoder processing load to take advantage of decoder processing capability that would otherwise be unused.

28. (original) The video encoder of claim 27 wherein the processing capabilities of the decoder are determined as a function a number of macroblocks that can be decoded in a given interval if all macroblocks are skipped.

29. (original) The video encoder of claim 28 wherein a maximum frame rate is determined in accordance with the following expression:

$$MaxFrameRate = \frac{1}{\frac{N_{coded}}{MaxMBPS} + \frac{N_{skipped}}{MaxSKIPPED}}$$

where N_{coded} is the number of coded macroblocks, $N_{skipped}$ is the number of skipped macroblocks, MaxMBPS is the maximum number of macroblocks that can be decoded in a given interval, and MaxSKIPPED is the maximum number of macroblocks that can be decoded in a given interval if all macroblocks are skipped.

30. (original) The video encoder of claim 27 wherein video quality is increased by increasing a frame rate.

31. (original) The video encoder of claim 27 wherein video quality is increased by increasing an picture size.

32. (original) The video encoder of claim 30 wherein the frame rate is further determined as a function of a computational cost of the decoder to decode various types of macroblocks.

33. (original) The video encoder of claim 31 wherein the picture size is further determined as a function of a computational cost of the decoder to decode various types of macroblocks.

IX. EVIDENCE APPENDIX

None.

X. RELATED PROCEEDINGS APPENDIX

None.